

AMENDMENTS AND REMARKS**Objections to the Claims:**

- 5 The Examiner objected to Claims 4 and 12 because of the following informalities: it is suggested to insert “at” before “least” in line 2 of the Claims 4 and 12.

The Applicant sincerely thanks the Examiner for discovering these typographical mistakes, and will thoroughly review the application to find any other mistakes that may
10 be present. Upon discovery of any additional mistakes, the Applicant will immediately contact the Examiner with the appropriate correction(s).

Rejections to the Claims:**35 USC § 102(b)**

- 15 The Examiner rejected Claim 1 under 35 U.S.C. § 102(b) as being anticipated by Tanjyo et al. (US Pat. No. 5,189,303), herein referred to as the “Tanjyo patent.”

The Federal Circuit stated that under 35 U.S.C. § 102(b), “There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of
20 ordinary skill in the field of the invention.” *Scripps Clinic & Research Found. V. Genentech Inc.*, 927 F.2d 1576.

Furthermore, the Federal Circuit stated that under 35 U.S.C. § 102, “anticipation requires the presence in a single prior art reference disclosure of each and every element of the
25 claimed invention, arranged as in the claim” *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452.

Therefore, in order to establish a prima facie case of anticipation the Examiner must set forth an argument that provides (1) a single reference (2) that teaches or enables (3) each
30 of the claimed elements (as arranged in the claim) (4) either expressly or inherently and

(5) as interpreted by one of ordinary skill in the art. All of these factors must be present, or a case of anticipation is not met.

In particular the Examiner stated regarding Claim 1, that the Tanjyo patent teaches “an
5 ion source (referring to Figure 1) comprising: ... an array of magnets (referring to 40 in
Figure 2) disposed in an extraction plate (referring to 2 in Figure 1) arranged at the exit of
the chamber (referring to 6 in Figure 1) and (referring to column 5 line 4 to column 6 line
30, and column 10 line 50 to column 11 line 20).”

10 **Regarding Claim 1 rejection over the Tanjyo patent**

Independent Claim 1 of the present invention recites the limitation that “... an array of
filtration magnets positioned near the plasma source exit, and parallel to the plasma source
exit plane...” The Applicants submit that this limitation is not taught, disclosed, or
suggested in the Tanjyo patent. Specifically, as stated in lines 2 to 4 of the abstract of the
15 Tanjyo patent, the Tanjyo patent teaches that four, five, six or so electrode plates (referring
to 1, 2, 4, 5 in Figure 1) are installed at the outlet of the ion source, in contrast with the
array of filtration magnets (122 in Figure 1) of the present invention. These electrode
plates (referring to column 5 lines 24 to 46 and 1, 2, 4, 5 in Figure 1) are not filtration
magnets.

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In addition, the Tanjyo patent further states that the second or third one of the electrodes
has Wien filters at the ion holes (referring to lines 4 to 9 of the abstract), wherein a Wien
filter has permanent magnets and electrodes for producing a magnetic field. The Tanjyo
patent further states (referring to column 6 lines 10 to 30 and column 10 line 50 to
25 column 11 line 21) that the Wien filter comprises a pair of permanent magnets (referring
to 40 and 41 in Figure 2) and a pair of permanent parallel electrodes (referring to 42 and
43 in Figure 2), wherein the permanent magnets and the permanent electrodes work
together within the Wien filter. That is, the permanent magnets in the electrode plates
cannot operate properly without the permanent electrodes, and thus the permanent
30 electrodes cannot be removed from the invention of the Tanjyo patent without destroying
its functionality. In contrast, the present invention claims “an array of filtration magnets

positioned near the plasma source exit,” without utilizing Wien filters with permanent electrodes.

5 Furthermore, the Tanjyo patent states that the extraction electrode plate containing the Wien filters (referring to column 5 lines 47 to 50) is the main point of novelty of the Tanjyo patent. Therefore, the Tanjyo patent teaches away from removing the extraction electrode plate, which contains permanent magnets and permanent electrodes, in order to replace them with an array of filtration magnets as claimed by the present invention.

10 Moreover, the Tanjyo patent teaches an ion source for producing wide, large area type ion beams with a mass-separation device (referring to lines 1 and 2 of the abstract), but it does not specifically teach generating “atomic oxygen ions” as claimed by Claim 1 of the present invention. In addition, the Tanjyo patent never teaches or suggests using the ion source to polish diamond surfaces as claimed by Claim 1 of the present invention.

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Therefore, the Applicants submit that the Tanjyo patent does not teach, disclose or suggest all of the claim limitations of Claim 1.

20 Because the Tanjyo patent fails to teach all the elements of Claim 1, arranged exactly as in Claim 1, for reasons discussed above, the Applicants respectfully requests that this rejection of Claim 1 under 35 U.S.C. § 102(b) be withdrawn.

35 USC § 103(a)

25 The Examiner rejected Claims 2, 7, 8, and 11 under 35 U.S.C. § 103(a) as being unpatentable over Tanjyo et al. (US Pat. No. 5,189,303), herein referred to as the “Tanjyo patent,” in view of Leung et al. (US Pat. No. 5,198,677), herein referred to as the “Leung patent.”

30 The Examiner stated that the Tanjyo patent teaches all the limitations of the claims of the present invention with the exception of the filament formed of tungsten, the cooling

jacket for cooling the magnets arranged around the chamber, and the cylindrical molybdenum shield.

The Examiner further stated that the Leung patent teaches an ion source (referring to Figure 1) that includes a filament (referring to 57 in Figure 1) made of tungsten, a cooling channel formed between a plasma generation chamber (referring to 12 in Figure 1) and cylindrical wall (referring to 14 in Figure 1) for cooling magnets (referring to 13 in Figure 1) in the channel, and a liner (referring to 45 in Figure 1) made of a high temperature resistant material such as molybdenum provided within the chamber (referring to column 3 line 10 through column 4 line 10).

Therefore, the Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the filament material, the magnet cooling mechanism, and the liner as taught by the Leung patent in the apparatus of the Tanjyo patent as a suitable material for filament, cooling the magnets, and protecting the inner surface of the chamber from plasma attack, respectively.

The Applicants sincerely thank the Examiner for acknowledging that the Tanjyo patent does not teach the filament formed of tungsten, the cooling jacket for cooling the magnets arranged around the chamber, and the cylindrical molybdenum shield.

As noted by MPEP 2143.03 to establish a *prima facie* case of obviousness, all the claim limitations must be taught or suggested by the prior art. The Applicants respectfully submit that the combination of the Tanjyo patent with the Leung patent does not teach all of the claim limitations of Claim 1 and Claim 7. Specifically, the Applicants assert that the combination does not teach, disclose, or suggest “an array of filtration magnets positioned near the plasma source exit, and parallel to the plasma source exit plane, said array of filtration magnets separating the reaction chamber into an upstream region containing the confinement magnets and a downstream region,” as is claimed in Claims 1 and 7.

As stated before, and repeated here for clarity, the Tanjyo patent (lines 2 to 4 of the abstract) teaches that four, five, six or so electrode plates (referring to 1, 2, 4, 5 in Figure 1) are installed at the outlet of the ion source, in contrast with the array of filtration magnets (122 in Figure 1) claimed by the present invention. Furthermore, in contrast
5 with the present invention, the Tanjyo patent and the Leung patent do not teach, disclose, or suggest to use the ion source to polish diamond surfaces as claimed by Claim 1 of the present invention.

Therefore, the Applicants submit that the Leung patent, in combination with the Tanjyo
10 patent and the knowledge of one skilled in the art, does not teach, disclose or suggest all of the claim limitations of Claims 1 and 7.

Further, “if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or
15 motivation to make the proposed modification.” *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

As stated previously, the Tanjyo patent claims that the second or third one of the electrodes has Wien filters at the ion holes (referring to lines 4 to 9 of the abstract),
20 wherein a Wien filter comprises a pair of permanent magnets (referring to 40 and 41 in Figure 2) and a pair of permanent parallel electrodes (referring to 42 and 43 in Figure 2), wherein the permanent magnets in the electrode plates cannot operate properly without the permanent electrodes, and thus the permanent electrodes cannot be removed from the invention of the Tanjyo patent without destroying the functionality of the invention of the
25 Tanjyo patent. In contrast, the present invention claims “an array of filtration magnets positioned near the plasma source exit,” without utilizing Wien filters with permanent electrodes.

Therefore, since modifying the invention of the Tanjyo patent by removing the extraction
30 electrode plate, which contains the Wien filters, in order to replace them with an array of filtration magnets as claimed by the present invention, would render the invention of the

Tanjyo patent unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

5 In addition, the Tanjyo patent implicitly teaches away from the suggested modification of replacing the extraction electrode plate containing the Wien filters with the array of filtration magnets of the present invention, since the Tanjyo patent claims that the extraction electrode plate containing the Wien filters (referring to column 5 lines 47 to 50) is the main part of novelty of the Tanjyo patent.

10 The Applicants respectfully conclude that the proposed modification of replacing the extraction electrode plate containing the Wien filters of the Tanjyo patent with an array of filtration magnets of the present invention, would change the principle of operation of the the Tanjyo patent. Thus it would not have been apparent to any one skilled in the art to use the prior arts in this manner, since the combination of the prior art references would
15 render the invention of the Tanjyo patent unsatisfactory for its intended purpose.

Further, the Applicants submit that the prior art references do not contain any suggestion or motivation express or implied that they be combined. Therefore, the teachings of the references are not sufficient to render Claim 7 *prima facie* obvious. MPEP 706.02(j)
20 states that the teaching or suggestion to make the claimed combination ... must be found in the prior art and not based on applicant's own disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). Applicants are unaware where in either the Tanjyo, or Leung patent it is taught, disclosed or suggested to implement the filament material, the magnet cooling mechanism, and the liner as taught by the Leung patent in the apparatus of the Tanjyo
25 patent as a suitable material for filament, cooling the magnets, and protecting the inner surface of the chamber from plasma attack, respectively. The Applicants respectfully request that the Examiner indicate where in the prior art he is finding the motivation to combine the references.

For the foregoing reasons the Applicants respectfully believe that Claim 7, as written, is patentable over the combination of prior art references and respectfully requests that this rejection of Claim 7 under 35 USC §103(a) be withdrawn.

5 **Dependent Claims**

Claims 2-6 are dependent upon Claim 1 and Claims 8-14 are dependent upon Claim 7. For the reasons given above, the Applicants submit that Claims 1 and 7 are patentable over the cited prior art. Therefore, the Applicants submit that Claims 2-6 and 8-14 are also patentable over the cited prior art at least based on their dependence upon an

10 allowable base claim.

Closing Remarks:

In view of the foregoing, it is respectfully submitted that all now pending claims 1-14 are in allowable condition. Reconsideration is respectfully requested. Accordingly, early allowance and issuance of this application is respectfully requested.

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In the event the Examiner wishes to discuss any aspect of this response, or believes that a conversation with either the Applicants or Applicants' representative would be beneficial the Examiner is encouraged contact the undersigned at the telephone number indicated below.

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The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 50-2691. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 50-2691.

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Respectfully submitted,

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Date


Cary Tope-McKay
Registration No. 41,350

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Cary Tope-McKay
TOPE-MCKAY & ASSOCIATES
23852 Pacific Coast Highway #311
Malibu, CA 90265
Tel: 310.589.8158
Mobile: 310.383.7468
Fax: 310.943.2736
E-mail: cmckay@topemckay.com

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